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Revision of the Palaearctic and Oriental species of the genus *Naarda* Walker, 1866 (Lepidoptera, Erebidae, Hypeninae). Part 3. Description of three new species from Asia

Balázs Tóth[1], László Ronkay[1]

1 *Collection Lepidoptera, Hungarian Natural History Museum, Baross utca 13, HU-1083 Budapest, Hungary; balazs0toth@gmail.com, ronkay@nhmus.hu*

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Abstract. We revise the *Naarda egrettoides* species-group and describe and illustrate three new *Naarda* species: *N. ardeola* sp. n. (Thailand), *N. egrettoides* sp. n. (Thailand) and *N. pocstamasi* sp. n. (Vietnam).

Introduction

The authors began revising the genus *Naarda* in 2000 with the study of the Noctuidae s.l. fauna of Taiwan. In the process, it was discovered that more species occur in Taiwan than was formerly indicated in the literature (Wileman 1915; Strand 1920; Heppner & Inoue 1992). Subsequent studies carried out on the extensive *Naarda* material from different parts of eastern and south-eastern Asia led to an unexpected increase of the known species richness of the genus, with the number of Asiatic species exceeding 80.

These results were first presented by BT (2010) at the IXth European Congress of Entomology (Lepidoptera taxonomy and biogeography section), announcing the publication of the undescribed species in the near future before the revision of the whole genus, including its African, Eurasiatic and Australian species, could be accomplished.

The first two parts of the relevant series of articles deal with the taxonomy and biogeography of the genus *Naarda* Walker, 1866 and contain an overview of this large and diverse group, including the general morphological characterisation of the main lineages and the descriptions of altogether 39 new species from eastern and south-eastern Asia (Tóth & Ronkay in press a, b).

The present paper contains the survey of a compact and in the male genitalia highly apomorphic species-group, the *Naarda egrettoides* lineage, including the description of three new species from the south-eastern border zone of the Palaearctic region.

Material and methods

All but one specimen of the material examined belonging to the *Naarda egrettoides* lineage are deposited at the Hungarian Natural History Museum, Budapest (HNHM); a specimen of a currently unnamed species from eastern China is held by the Alexander Koenig Museum, Bonn (ZFMK).

Genitalia dissections were made using the standard method of preparation resulting in permanent microscopic slides. Genital structures were macerated in 10% KOH solution and lactic acid, stained with alcoholic solution of Eosine and mounted in Euparal. Eosine was preferred in contrast to Chlorazol Black because of the dominance of chitinous structures in the genitalia. The genital terminology follows the detailed explanation given in the first part of the series of papers (Tóth & Ronkay in press a).

Abbreviations

BMNH	The Natural History Museum, London
HNHM	Hungarian Natural History Museum, Budapest
MNHN	Museum National d'Histoire Naturelle, Paris
RL	genitalia slide of László Ronkay
TB	genitalia slide of Balázs Tóth
ZFMK	Alexander Koenig Museum, Bonn – Zoologisches Forschungsinstitut und Museum Alexander Koenig

Characterisation of the *Naarda egrettoides* species-group

The species-group is very compact and comprises three closely related species, which are easily separable from members of all other lineages of the genus by the features of the males (see below); the females are also characteristic but display no key features except for the colouration and the fine and less prominent dark markings.

External morphology. The diagnostic features are the long bipectinate male antenna, the very long, porrect labial palpi of both sexes, the rather large size, the long and relatively broad forewings with straight costa, and the weak, fine darker markings on a pale greyish or brownish ground colour. The rami of the antenna are at the maximum of its width 9–10 times longer than the axis of the antenna; the apical segments lack the rami. The palpi are ca. 5 times as long as the diameter of the eye, with the third segment comparatively longer, and more elongated than in most other members of the genus. The wingspan is 19–22 mm.

Male genitalia. The most prominent autapomorphy of the group is the structure of the uncus (see Figs 1, 3, 5), which appears as a head of a long-billed bird. The uncus has a large, rounded subbasal dorsal bulb bearing a small but acute frontal spine and a large bundle of long hairs standing apart (like a forelock) and long, straight, apically finely dilated and rounded distal section. Other group features of the clasping apparatus are the large, broad tegumen, the well-developed and strong transtilla and the variably broad, generally triangular valvae with which the entire structure resembles a flying bird (wader). Phallus short, thick and straight, vesica basally broad and inflated, ductus ejaculatorius directed forward in the axis of the phallus and vesica. Cornutus variably large, flattened and somewhat 'sponge cake'-like, situated subbasally at ventral side.

Synopsis

ardeola sp. n. (Northern Thailand)
pocstamasi sp. n. (Northern Vietnam)
egrettoides sp. n. (Northern Thailand)

Descriptions of the new species

Naarda ardeola sp. n.

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Figs 1, 2, 7, 8

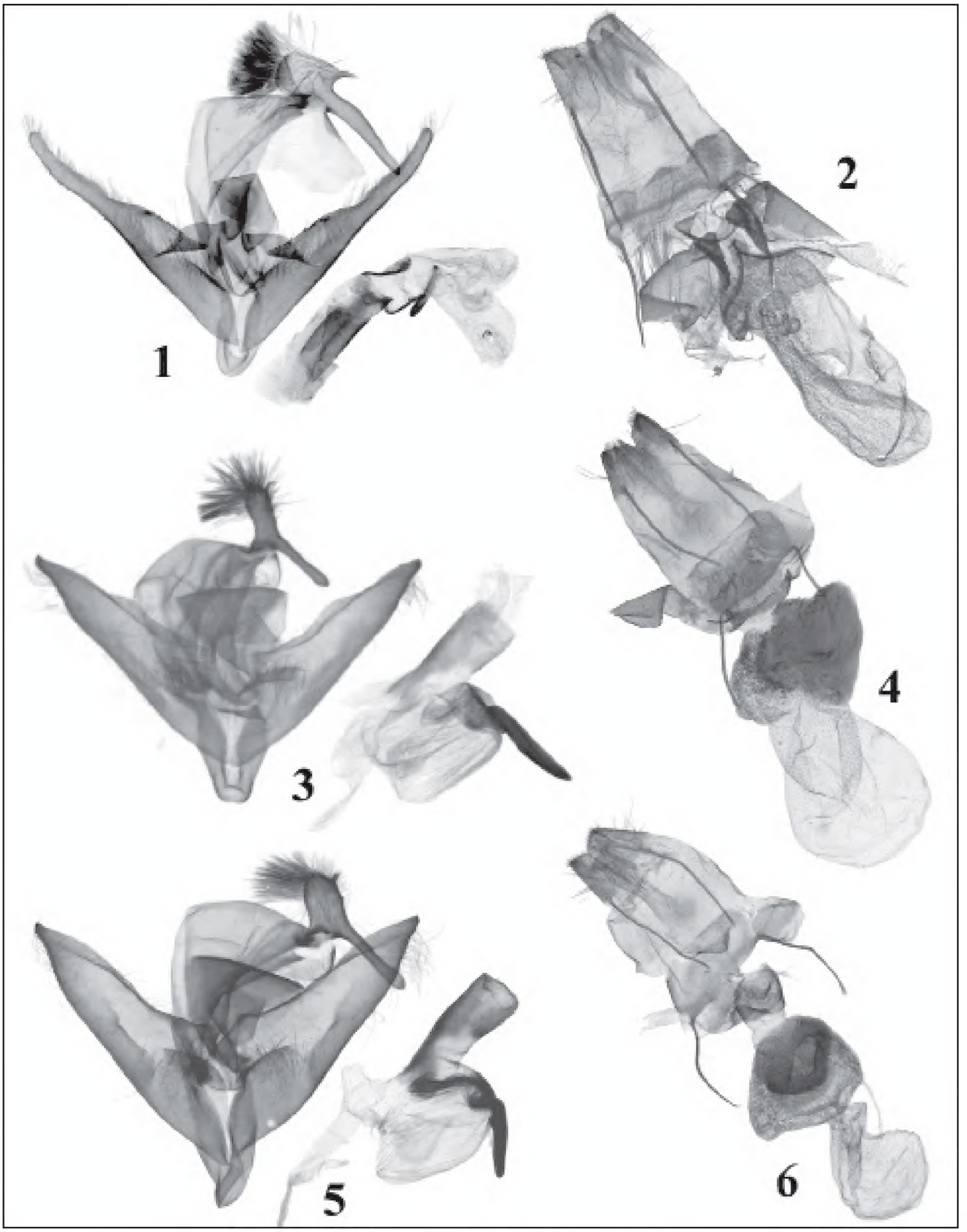
Holotype. ♂, 'Thailand: Prov. Chiang Mai | between Chiang Dao and Kariang, 900 m | 99°48'E, 19°25'N, 26.x.2002 | leg. B. Herczig & G. Ronkay' slide No. RL7898m (coll. HNHM).

Paratypes. Thailand: 2♀, data as holotype, slide No. TB398f; 1♀, 'Prov. Chiang Mai | 1600m, between Fang and Nor Lae | 99°09'E, 20°02'N, 28.x.2002 | leg. B. Herczig & G. Ronkay' (coll. HNHM); 1♀, '50 km NW Mae Hong-Son | by Shan, 800 m, 14.vii.2003 | leg. M. Fibiger' slide No. TB424f (coll. HNHM).

Description. Wingspan 20–21 mm, length of forewing 10–11 mm. Antennae bipectinate in male but apical segments lack rami, filiform and ciliate in female; longest male rami at mid third, 9 times longer than diameter of flagellum, rami with cilia as long as diameter of flagellum; in female each segment with two cilia as long as diameter of flagellum. Labial palps similar in both sexes; their length 5 times diameter of eyes; 3rd segment relatively long and narrow, its tip pointed, light; 2nd segment broad, dorsal scales long, their length descending towards tip. Scale-hood of vertex broad, tapering, in male relatively long, apically slightly bifurcate, in female long, its tip rounded. Base of male forewing with scent-organ built up of long, hairy scales. Characteristic wing pattern features: forewing costa minutely concave in male; pattern similar in both sexes: ground colour light brown, subterminal line slightly paler, slightly sinuous, with some blackish dots at inner side; postmedial line slightly darker than ground colour, indistinct; reniform stigma big, oval, deep ochreous, hardly visible, with small blackish dot at bottom section; orbicular stigma also deep ochreous, indistinct. Hindwing slightly paler than forewing, with slightly more conspicuous fasciae.

Male genitalia (Fig. 1). Uncus relatively long, straight, tapering, its tip rounded, basal part containing globular bulb with short spine close to elongate part of uncus, and a hairy area oppositely. Scaphium very short, straight. Tegumen longer than vinculum. Transtilla enormously wide; its basal part is the broadest in the genus. Saccus not visible. Base of valva narrow; valva slightly tapering, its tip very narrow, rounded. Sacculus wide, short, distally fused with the homogeneous fused structure constructing the apical two-thirds of valva. Phallus elongate, straight, not tapering; carina with two narrow, curved processes; vesica oval, smooth, with long, broad diverticulum and strong, straight cornutus with rounded tip.

Female genitalia (Fig. 2). Ovipositor lobes slightly elongate, angular. Apophyses quite broad and long, apophyses posteriores 1.3 times longer than apophyses anteriores. Lamella antevaginalis short, angular. Sinus very short and wide. Sternum A7 with two strongly sclerotised narrow bands laterally from ostium, and a proximally located sclerotised triangular field. Ductus



Figures 1–6. Male and female genitalia of the species of the *Naarda egrettoides* species-group. **1.** *Naarda ardeola* sp. n. (RL7898m); **2.** *Naarda ardeola* sp. n. (TB398f); **3.** *Naarda pocstamasi* sp. n. (RL10762m); **4.** *Naarda* sp. (TB443f); **5.** *Naarda egrettoides* sp. n. (RL7899m); **6.** *Naarda egrettoides* sp. n. (TB390f).

bursae short, membranous, colliculum small. Corpus bursae elongate, not tapering, with dense scobination except for a dorsal area.

Diagnosis. The external appearance of *N. ardeola* is nearly unique: it can only be confused with *N. pocstamasi* sp. n., although the ground colour of *N. ardeola* is somewhat more yellowish, and the transverse lines are less conspicuous than in the latter taxon. The male genitalia of *N. ardeola* differ from those of *N. pocstamasi* by the more angular basal bulge and the slightly broader elongate section of the uncus, the longer and considerably narrower valva, and the more simple structure of the vesica of phallus, with shorter and narrower cornutus. The very elongate valvae in the male genitalia are somewhat similar to those of *N. serra* Holloway, 2008, but the other characters are very different: the basal part of uncus is much broader, with a bulb which is absent in *N. serra*, the scaphium is much shorter, and the base of transtilla is much broader. The penicular processes, being typical of *N. serra*, are absent in *N. ardeola*. The apical half of the valva is made of different structures: in *N. ardeola* it is the complete fusion of costa, cucullus and harpe, while in *N. serra* this part is the free cucullus.

Etymology. The heron-shaped male genitalia inspired the specific name.

Distribution. The species is known from the mountains of northern Thailand.

***Naarda pocstamasi* sp. n.**

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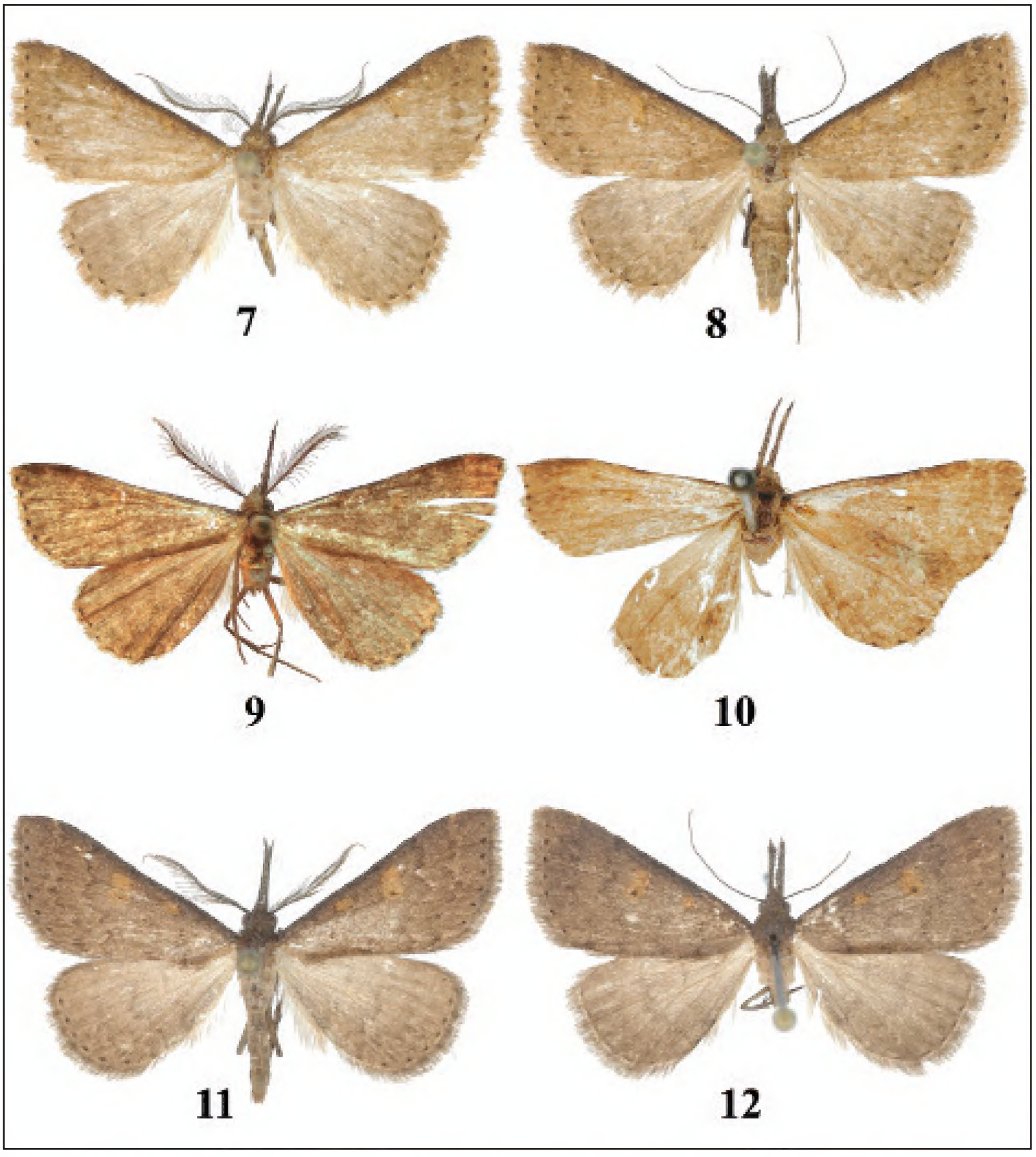
Figs 3, 9

Holotype. ♂, 'Vietnam, Prov. Lao Cai | Sa-pa, 1650 m | 23.ix.1963 | T. Pócs' 'lieu herb. second. | à la lumière' slide No. RL10762m (coll. HNHM).

Description. Wingspan 22 mm, length of forewing 11 mm. Antennae bipectinate (apical segments also), longest male rami at mid third, maximum 10 times longer than diameter of flagellum, rami with cilia ca 1.5 as long as diameter of flagellum. Labial palps slightly longer than 5 times diameter of eyes; 3rd segment quite long and narrow, its distal half lighter; 2nd segment relatively narrow, slightly tapering. Scale-hood of vertex broad and long, triangular and apically pointed. Fore- and midtibiae densely hairy. Characteristic wing pattern features: forewing costa not concave; ground colour light brownish grey (the specimen is somewhat worn), terminal line prominent, fragmented to blackish dots, subterminal, postmedial and antemedial lines present but indistinct, slightly sinuous; reniform stigma inconspicuous, medium-sized, broad, somewhat 8-shaped, with traces of dark edge, brownish ochreous with blackish dot at bottom third and traces of a brownish line in the axis; orbicular stigma rounded with indistinct blackish edge, its colouration like that of reniform, with some dark scales in its centre. Colouration and pattern of hindwing like that of forewing.

Male genitalia (Fig. 3). Uncus medium long, straight, its basal part a densely haired, elongate, apical part evenly narrow, its tip rounded. Tegumen as long as vinculum. Saccus broad-based, long, gradually tapering, its tip rounded. Juxta large, angular. Transtilla large, broad. Saccus not visible. Valva long, medium wide, gradually tapering, but dorsal edge slightly sinuous. Valval tip slightly rounded-truncate. Sacculus with very broad but short, densely haired basal half



Figures 7–12. Adults of the species of the *Naarda egrettoides* species-group. **7.** *Naarda ardeola* sp. n. male; **8.** *Naarda ardeola* sp. n. female; **9.** *Naarda pocstamasi* sp. n. male; **10.** *Naarda* sp. female; **11.** *Naarda egrettoides* sp. n. male; **12.** *Naarda egrettoides* sp. n. female.

and narrow, straight distal half connected to apical fused structure. Phallus very thick, evenly wide, straight; vesica globular, longitudinally striated with a large, straight, rounded, somewhat tongue-like cornutus.

Diagnosis. The external appearance of *N. pocstamasi* is similar to that of *N. egrettoides* sp. n., but the ground colour is lighter, and the transverse lines are more prominent in *N. pocstamasi*, making it easily recognisable. The male genitalia of this new species are very similar

to those of *N. egrettoides*, but the basal bulb of uncus is more elongate, the valva is somewhat narrower and more elongate, the costa is more sinuous, the phallus is shorter and thicker, and the cornutus is larger. In comparison with those of *N. kinabaluensis* Holloway, 2008, the uncus is much narrower and shorter, the scaphium is much shorter, the valva is somewhat narrower and its tip is pointed instead of being truncate.

Etymology. This new species is dedicated to its collector, a famous Hungarian botanist, Tamás Pócs.

Distribution. Northern Vietnam.

Remarks. This species appears to be the closest hitherto known relative of *N. egrettoides* sp. n. according to the male genitalia.

Naarda sp. near *egrettoides*

Figs 4, 10

Material examined. ♀, 'China: Shanghai | Prov. Kiangsu | leg. Höne' slide No. TB443f (coll. ZFMK).

Morphology. Wingspan 21 mm, length of forewing 10 mm. Antennae lost except for a few basal segments, those being ciliate, without rami or crests, length of cilia half times diameter of flagellum. Labial palps longest in the genus: length slightly less than 6 times diameter of eyes; 3rd segment relatively long, narrow, its apical third light; 2nd segment broad, dorsal scales very short (or maybe worn). Scale-hood of vertex broad-based, relatively short, its tip pointed. Characteristic wing pattern features: costa minutely concave; the only one known specimen is worn and possibly faded, ground colour greyish brown; transverse lines indistinct; bottom half of postmedial line hardly visible, dark, narrow, probably strongly angled inwards below cell; reniform stigma hardly visible, quite small, oval, dark ochreous, with a big blackish dot at the bottom third; orbicular stigma also hardly visible, small, dark ochreous. Ground-colour of hindwing like that of forewing, with two fasciae.

Female genitalia (Fig. 4). Ovipositor lobes small, angular. Apophyses long; apophyses posteriores ca 1.5 times longer than apophyses anteriores. Lamella antevaginalis angular, sclerotised, sinus absent. Ductus bursae broad but short, membranous, its mouth to corpus bursae located at the dorsal side of corpus bursae. Corpus bursae elongate, pyriform, posterior 2/3 part being scobinate, becoming sparser anteriorly, posterior 1/3 part with a very broad but quite short, smooth appendix.

Diagnosis. The wing shape of *N.* sp. nr. *egrettoides* is similar to that of *N. egrettoides* and *N. ardeola*, but the reniform stigma seems to be narrower, and the orbicular is smaller than in the latter taxa. The female genitalia are somewhat similar to those of *N. barlowi* Holloway, 2008, especially in the configuration of the appendix bursae, which is broad and situated close to the posterior tip of corpus bursae. This species lacks the sinus and the colliculum of ductus bursae and the corpus bursae is only sparsely scobinate, in contrast to *N. barlowi*.

Distribution. South-eastern China (Prov. Jiangsu), at the transitional zone of the Palaearctic and Oriental Regions.

Remarks. The long labial palps and the main structure of the female genitalia are similar to those of *N. egrettoides* and *N. ardeola*, but more material, and especially the knowledge of the

male genitalia, are essential to decide on the more exact taxonomic assignment of this individual. To make the situation even more difficult, the type locality has apparently been destroyed by development in the last seventy years.

Naarda egrettoides sp. n.

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Figs 5, 6, 11, 12

Holotype. ♂, 'Thailand: Prov. Chiang Mai | 4 km S Kop Dong, 1800 m | 99°03'E, 19°52'N, 6.xi.2002 | leg. B. Herczig & G. Ronkay' slide No. RL7897m (coll. HNHM).

Paratypes. Thailand: 1♂, 3♀, 'Prov. Nan | Doi Phu Kha NP | between Pua and Bo Luang, 1350 m | 101°05'E, 19°12'N, 3.xi.2002 | leg. B. Herczig & G. Ronkay' slide No. RL7899m (coll. HNHM); 2♂, 2♀, 'Prov. Chiang Mai | 1600m, between Fang and Nor Lae | 99°09'E, 20°02'N, 28.x.2002 | leg. B. Herczig & G. Ronkay' slide No. TB390f (coll. HNHM).

Description. Wingspan 19–22 mm, length of forewing 10–11 mm. Antennae bipectinate in male but apical segments lacking rami, filiform and ciliate in female; longest male rami at mid third, 9 times longer than diameter of flagellum, rami with cilia as long as diameter of flagellum; in female each segment with four cilia on each side shorter than diameter of flagellum. Labial palps similar in both sexes; length 5 times diameter of eyes; 3rd segment quite long and narrow, its tip pointed, light; 2nd segment broad, dorsal scales long, in male length of scales descending towards tip, in female scale length uniform. Scale-hood of vertex broad-based and long in both sexes, in male its tip finely bifurcate, in female rounded. Characteristic wing pattern features: forewing costa not concave in male; sexes similar; ground colour greyish brown, subterminal and postmedial lines parallel, sinuous, inner part of them dark grey, outer part mouse-grey; medial and antemedial lines also present but indistinct; reniform stigma large, thick, oval, deep ochreous (honey-coloured) with blackish dot at bottom third; orbicular stigma longitudinally elongate, also honey-coloured, with indistinct blackish edge. Hindwing slightly paler than forewing, postmedial line more visible than subterminal line.

Male genitalia (Fig. 5). Uncus relatively long, straight, apically slightly dilated, its tip rounded, basal bulb oval, spine on bulb tiny, situated in front of the connection of bulb and tegumen. Scaphium very short, straight. Transtilla very broad, its base wide. Tegumen slightly longer than vinculum. Saccus not visible. Valva relatively broad-based, triangular, gradually tapering, its tip pointed. Dorsal edge of valva slightly concave. The fused structure present at distal half of valva. Sacculus with broad but short basal half and narrow, straight distal half connected to apical fused structure. Phallus thick, slightly curved, slightly tapering towards carina. Vesica globular, longitudinally striated, with strong, straight, broad and apically rounded, somewhat tongue-shaped cornutus (seen from edge on the figure).

Female genitalia (Fig. 6). Ovipositor lobes slightly elongate, relatively small, angular. Apophyses narrow, apophyses posteriores very slightly (1.1 times) longer than apophyses anteriores. Lamella antevaginalis short, angular. Sinus absent. Sternum A8 with small triangular plate arranged anteriorly. Ductus bursae broad, short, membranous. Corpus bursae composed from of two equal-sized globular halves connected by narrow region; posterior part densely

scobinate by tiny spines, anterior part smooth except for small, sparsely scobinate area near the connection to distal part.

Diagnosis. Based on their morphology, it appears that the sister-species of *N. egrettoides* is *N. pocstamasi*; their detailed comparison is given under the diagnosis of the latter. *N. egrettoides* differs externally from the other close relative, *N. ardeola*, by the darker, more greyish colouration. In the male genitalia, *N. egrettoides* and *N. pocstamasi* have, in comparison with *N. ardeola*, much broader valvae, more rounded basal bulge of uncus and much larger cornutus in the vesica. The male genitalia of *N. egrettoides* are somewhat similar to those of *N. ineffectalis* (Walker, 1858), but in the new species the tip of uncus is not concave while the base of uncus is much broader, the juxta is smaller, the valva is more elongate, the sacculus is broader, the cornutus of phallus is straighter and the vesica is larger and more globular than in *N. ineffectalis*.

Etymology. Egrettoides = egret-like; the shape of male genitalia is similar to a flying egret.

Distribution. The mountains of northern Thailand.

Remarks. The longitudinally elongate shape of the orbicular stigma is a rare feature in the genus.

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